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11. (New) A method of using an emulsible polyolefin wax to emulsify substances, said method comprising mixing said emulsible polyolefin wax with a second substance in an aqueous medium under conditions sufficient to emulsify both said emulsible polyolefin wax and said second substance, said emulsifiable polyolefin wax having a melt viscosity of less than 1,000 cps at 190°C, said emulsible polyolefin wax being prepared by reacting maleic anhydride with a starting material of either polypropylene or ethylene-propylene copolymer, wherein the amount of said maleic anhydride added to said starting material is about 0.1% to about 25 wt % of said starting material.
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12. (New) The method of claim 11, wherein said substance has a Mw greater than that of said emulsible polyolefin wax.
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13. (New) The method of claim 12, wherein said emulsible polyolefin wax has a Mw of about 10,000 to about 20,000, and a melt viscosity of about 200 to about 800 cps.

REMARKS

Prior Art Rejections

The examiner rejected claims 1-7 under 35 U.S.C. 102(b) as being anticipated by Mainord (U.S. Patent 4,613,679), or alternatively under 35 U.S.C. 103(a) as being obvious over Mainord. More specifically, the examiner stated that Mainord discloses "emulsifiable polyolefin waxes prepared by reacting polyolefin with diesters of maleic acid . . . , for example, homopolymers and copolymers containing propylene, ethylene-propylene copolymer . . . , having a melt viscosity range of from about 23-500 cps . . . and an emulsion light transmittance of 81%." In response, applicants submit that Mainord fails to teach or suggest each and every element of the claimed invention as amended.

Claimed Invention

The claimed invention is directed to a highly-emulsible, functionalized polyolefin wax capable of forming exceptionally high clarity emulsions. More specifically, an approach has been developed to functionalize a commercially-available, exceptionally low color polyolefin

wax with maleic anhydride to form a highly-emulsible polyolefin wax without substantially altering the wax's aesthetic properties. The highly-emulsible polyolefin wax of the claimed invention can be used not only to form high clarity emulsions, but also to emulsify other substances which are otherwise un-emulsible.

According to claims 1-10, the high-clarity, emulsible polyolefin wax is prepared by reacting maleic anhydride with a starting material of polypropylene or ethylene-propylene copolymer to form an emulsible wax having desirable properties. As claimed, the maleic anhydride is added to the reactor in an amount of about 0.1% to about 25 wt % of the starting material. The emulsible polyolefin wax has a melt viscosity of less than 1,000 cps at 190°C, a Gardner color index of no greater than about 9, and an emulsion light transmittance of at least 20% at 525 nm with a 20 mm light path length. With respect to claim 3, an emulsion light transmittance of at least 50% at 525 nm with a 20 mm light path length is recited. Furthermore, with respect to claims 9 and 10, the emulsible polyolefin wax has a Gardner color index of no greater than about 8 and 7, respectively.

With respect to new claims 11-13, a unique use of the highly-emulsible wax is recited. Specifically, the claims recite using the emulsible polyolefin wax to emulsify substances which are not otherwise emulsible. In other words, the emulsible wax acts as a "carrier" to emulsify other substances which tend to be more difficult or impossible to emulsify individually. The second substance preferably has a high molecular weight to impart toughness to the emulsion composition.

Argument

The Mainord reference is devoid of any suggestion of preparing an emulsible wax having the claimed properties by reacting maleic anhydride with a polypropylene or ethylene-propylene copolymer wax. Mainord is directed to a low-color wax prepared by reacting *diesters of maleic acid* with a low-molecular weight polyolefin wax. More specifically, Mainord recognizes that low viscosity homopolymers and copolymers of alpha-monomer having 3 - 12 carbon atoms can be modified using diesters of maleic acid in the presence of a

free radical source to produce polymers having desirable physical and chemical properties such as low color and good emulsifiability. Mainord, col. 1, ll. 52-62.

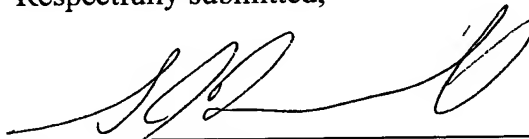
Mainord does not teach or suggest, however, modifying polypropylene or ethylene-propylene copolymer wax with maleic anhydride. To the contrary, Mainord clearly *teaches away* from preparing an emulsible wax by modifying the wax with maleic anhydride. More specifically, Mainord states that emulsible polypropylene waxes prepared by reacting maleic anhydride with a low-molecular weight polypropylene in the presence of a peroxide catalyst have the disadvantage of being colored. Mainord, col. 1, ll. 15-24, and col 3, ll.36-40. Mainord provides an example of such a maleic anhydride-modified polymer having an acid number of 45 and a melt Gardner color of from 8 to 13 which is considered unacceptably dark. *Id.*, at col. 1, ll. 24-27. Mainord states that high color has prevented maleic anhydride-modified waxes from being used in floor polishes where clarity is a requirement. *Id.* at ll. 27-29. Therefore, given Mainord's negative assessment of functionalizing a wax with maleic anhydride, Mainord certainly provides no suggestion of using maleic anhydride to achieve the emulsible wax of the claimed invention, much less in the amount of about 0.1% to about 25 wt % of the starting material as claimed.

In addition to Mainord teaching away from functionalizing a wax with maleic anhydride, modifying the Mainord process to use maleic anhydride would contravene an object of Mainord's invention. More specifically, Mainord states that an object of the invention is to improve the emulsifiability of unemulsible poly-alpha olefins by reacting the unemulsible poly-alpha olefins with diesters of maleic acid. Mainord, col. 1, ll. 41-44. In fact, Mainord characterizes the invention as being a departure from modifying waxes with maleic anhydride to produce waxes of desirable color, stating that "[a]lthough it is known in the art to react Maleic anhydride with polypropylene to form emulsifiable waxes with high color, it is not obvious that diesters of maleic anhydride would react to form emulsifiable waxes with low color." *Id.*, at col. 3, ll. 36-40. Thus, an important, if not critical object of the invention of Mainord, is to functionalize polypropylene wax using a diester of maleic anhydride. Substituting maleic anhydride for a diester of maleic anhydride would clearly ignore and contravene this object. As such, there can be no motivation to do so.

Mainord fails to teach or suggest using an emulsible polyolefin wax to emulsify a substance which is otherwise not emulsible. As mentioned above in the invention's summary, the functionalized wax of the claimed invention can act as a "carrier" to emulsify other substances which tend to be difficult or impossible to emulsify individually. The second substance preferably has a higher molecular weight to impart toughness to the emulsible wax composition. Mainord is devoid of any mention of using the emulsible wax to emulsify other substances despite identifying a need to so. Specifically, Mainord states that using a diester of maleic anhydride to modify polyethylene, instead of polypropylene, results in a modified wax having good color but with poor emulsifiability. Mainord, col. 3, ll. 50-54. No mention was made regarding mixing this desirable compound with modified polypropylene to emulsify it. Thus, even though Mainord was faced with the problem that the claimed invention is intended to solve, Mainord provided no indication of solving it in accordance with the claimed invention. As such, Mainord clearly lacks motivation for such a use.

In light of the amendment and remarks above, applicants request that the examiner withdraw the rejection and allow the claims as amended.

Respectfully submitted,



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